

REMARKS

Applicant appreciates the thorough examination of the present application that is evidenced in the Official Action of December 30, 2005 (the "Official Action"). Claims 1-20 and 31-40 are pending in the present application. Applicant has amended Claims 1, 17-20, 31 and 37. Claims 8-10 and 32-36 have been cancelled. For at least the reasons explained below, Applicant submits that the remaining Claims, as amended, are patentable over the cited art.

In the Official Action, Claims 1-20 and 31-40 were rejected under 35 U.S.C. § 103(a) as being unpatentable over subject matter characterized in the Official Action as applicant's prior art admissions ("APA") or Adesida et al. in view of Chen et al., Wang et al. and U.S. Patent No. 6,150,680 to Eastman et al. (hereinafter "Eastman").^{1,2} Claims 31-32 were rejected under 35 U.S.C. § 102(a) as anticipated by Chang et al. Claims 1-20 and 31-40 were further rejected under 35 U.S.C. § 103(a) as being unpatentable over APA or Adesida et al. in view of Chen et al., Wang et al. and Eastman, and further in view of Chang et al.

Applicant has amended Claim 1 to recite at least one energy barrier adjacent one of the barrier layer and/or the channel layer, the energy barrier comprising a fully depleted, delta doped electron source layer in proximity with and spaced apart from a fully depleted, delta doped hole source layer by a high field region (emphasis added). Support for this amendment may be found, for example, at page 12, lines 33-34 and page 15, lines 7-8 of the present application.

Applicant respectfully submits that none of the cited references nor the APA teaches or suggests providing an energy barrier that includes a fully depleted, delta doped electron source layer in proximity with and spaced apart from a fully depleted, delta doped hole source layer by a high field region. The Official Action states that Chen, Wang and Eastman provide energy barriers. However, while Chen teaches an n+/i/p+ sequence, there is no indication in Chen that in the InP material system, this sequence provides an energy barrier as recited in Claim 1. In fact, Chen attributes the charge transfer confinement only to the "p-buffer layer," See Chen, p. 162, Introduction, and p.163, first column. In contrast, the i layer is merely termed a "set-back layer" by Chen, while the n+ layer is termed an "elec. source layer." See Chen, Fig. 1.

It appears that the purpose of the n+ layer is to supply electrons to the channel, which is only 50 Å from the n+ layer, and does not participate in providing carrier confinement,

which, as noted above, Chen attributes solely to the p+ buffer layer. In addition, in Fig. 1, Chen groups the i-layer and the n+ layer together, while the p+ layer is separated from these layers by a line, suggesting that the i and n+ layers function cooperatively and independently from the p+ layer.

Furthermore, there is no indication in Chen that either the p+ layer or the n+ layer is fully depleted.

Similar to Chen, Chang, Wang and Eastman disclose providing a p-doped buffer for improved carrier confinement. However, neither Chang, Wang nor Eastman teach or suggest an energy barrier that includes a fully depleted, delta doped electron source layer in proximity with and spaced apart from a fully depleted, delta doped hole source layer by a high field region. For example, while Eastman discusses depletion of the p+ layer 11 and n+ layer 12, these layers are immediately adjacent to one another, and do not appear to be delta doped. See Eastman, col. 3, ll. 56-68. Thus, Eastman does not teach an energy barrier that includes a fully depleted, delta doped electron source layer in proximity with and spaced apart from a fully depleted, delta doped hole source layer by a high field region.

Accordingly, Applicant respectfully submits that Claim 1 is patentable over the cited references for at least these reasons.

Dependent Claims 2, 5-7 and 11-16 are patentable at least per the patentability of Claim 1.

Independent Claims 17-20 have been amended to include similar recitations as Claim 1. Accordingly, Applicant submits that these claims are patentable for similar reasons as those discussed above with respect to Claim 1.

Claim 31 has been amended to include the recitations of cancelled Claim 36. As amended, Claim 31 recites a nitride based HEMT having a channel layer and including a quantum well adjacent the channel layer and configured to generate a built-in potential that opposes movement of carriers away from the channel layer. The Official Action did not address the limitations of cancelled Claim 36, and Applicant submits that the cited references do not teach or suggest a nitride based HEMT as recited in amended Claim 31. Furthermore, Applicant submits that Claims 37-40 are patentable at least per the patentability of Claim 31.

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CONCLUSION

In light of the above remarks, Applicant respectfully submits that the above-entitled application is now in condition for allowance. Favorable reconsideration of this application is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



David C. Hall
Registration No. 38,904

USPTO Customer No. 20792
Myers Bigel Sibley & Sajovec, P.A.
P. O. Box 37428
Raleigh, North Carolina 27627
Telephone: (919) 854-1400
Facsimile: (919) 854-1401

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Traci A. Brown